

# Properties of Logarithms Contraction

To contract (or condense) a log, do the opposite of expansion: take multiple log terms and put them together into a single term.

Condense:

$$\log_4(5) + \log_4(x) + \log_4(y)$$

$$\log_4(5xy)$$

$$\log_7(10) + 4 \log_7(z)$$

$$\log_7(10) + \log_7(z^4)$$

$$\log_7(10z^4)$$

Condense:

$$\log(5) - 2 \log(y) + \log z$$

$$\log(5) + \log(y^{-2}) + \log(z)$$

$$\log(5y^{-2}z)$$

$$\log\left(\frac{5z}{y^2}\right)$$

$$\frac{1}{2} \log_9(w) + \frac{1}{2} \log_9(x) - 3 \log_9(z)$$

$$\log_9(w^{1/2}) + \log_9(x^{1/2}) + \log_9(z^{-3})$$

$$\log_9(w^{1/2} x^{1/2} z^{-3})$$

$$\log_9\left(\frac{\sqrt{wx}}{z^3}\right)$$

Condense and then turn into an exponential equation.

$$5\log(x) + \log(y) - \log(z + 6) = 25$$

$$\log(x^5) + \log(y) + \log((z + 6)^{-1}) = 25$$

$$\log\left(x^5 y (z + 6)^{-1}\right) = 25$$

$$\log\left(\frac{x^5 y}{z + 6}\right) = 25$$

$$\frac{x^5 y}{z + 6} = 10^{25}$$